

Leon Reservoir

2022 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-4

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

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Survey and Management Summary

Fish populations in Leon Reservoir were surveyed in spring 2022 with tandem hoop netting, fall 2022 with electrofishing and trap netting, and gill netting in spring 2023. Historical data are presented with 2022 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

Reservoir Description: Leon Reservoir has a surface area of 1,756 acres, and it was constructed in 1954 by impounding the Leon River. The reservoir is in Eastland County, roughly seven miles south of the City of Eastland, and it is controlled by the Eastland County Water Supply District. Leon Reservoir is used for flood control, municipal and industrial water supply for the City of Eastland, and for recreation. Heavy rainfall in 2015 refilled and flooded the reservoir, though water level dropped five feet below conservation pool by summer 2018. Fall 2018 rainfall refilled the reservoir to full pool. The water level declined to about 7 ft. below conservation pool by May 2023.

Management History: Sport fish in the reservoir include Largemouth Bass, White Crappie, Channel Catfish, and White Bass. Hydrilla was first documented in the 2010 vegetation survey and was mechanically removed in one northeastern cove; additional areas containing miniscule patches of hydrilla were not treated. Hydrilla has remained in low coverage in the reservoir. The most recent stocking (Lonestar Bass) occurred in May 2023.

Fish Community

- **Prey species:** Threadfin Shad, Bluegill, Gizzard Shad and Longear Sunfish comprised most of the forage base for sport fishes. Gizzard Shad catch declined over the survey period, whereas Bluegill increased. Relative abundance of prey species appeared suitable to support sport fish populations.
- **Catfishes:** Channel Catfish catch down from the previous survey but similar to the 2015 gill netting. Sample sizes in these surveys were not large enough to effectively evaluate size structure and body conditions.
- **White Bass:** Total catch of legal White Bass have fluctuated in gill netting surveys. All fish in the 2023 sample were \geq stock-length. The population appeared to produce ample quality-length fish to be used by anglers.
- **Largemouth Bass:** Largemouth Bass relative abundance declined in 2022 compared to the previous two surveys. However, the catch of legal-length fish was similar compared to previous surveys. Like previous surveys, most individuals captured in the 2022 survey had suboptimal body condition (mean relative weights ≤ 90). Prevalence of Florida Largemouth Bass alleles have increased since 2006 which may be a result of recent stockings.
- **Crappie:** Both White Crappie and Black Crappie were present in the reservoir, but White Crappie have traditionally been more abundant. The combined catch of crappie increased compared to the previous survey. Combined catches of legal-length (i.e., ≥ 10 in.) individuals were low but nearly double the prior two surveys. Body conditions of crappie were adequate (mean relative weights > 90).

Management Strategies: Monitor Largemouth Bass and prey by electrofishing in fall 2026. Trap netting will be used in fall 2026 to monitor White Crappie and Black Crappie by trap netting. Channel Catfish and White Bass will be sampled in spring 2027 by gill netting. A roving creel survey will be conducted from June 1, 2026 – May 31, 2027.

Introduction

This document is a summary of fisheries data collected from Leon Reservoir during 2019-2023. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species was collected, this report deals primarily with major sport fishes and important prey fishes. Management strategies are included to address existing problems and/or opportunities. Historical data are presented with the 2019-2023 data for comparison.

Reservoir Description

Leon Reservoir has a surface area of 1,756 acres, and it was constructed in 1954 by the impoundment of the Leon River within the Brazos River Basin (Kemp et al. 2016). The reservoir is in Eastland County, roughly seven miles south of the City of Eastland, and it is controlled by the Eastland County Water Supply District (ECWSD). Leon Reservoir provides flood control, municipal and industrial water supply for the City of Eastland, as well as recreation. Leon Reservoir was eutrophic based on Carlson's Trophic State Index for chlorophyll-a (TSI Chl-a) with a TSI Chl-a of 59.6 (Texas Commission on Environmental Quality 2022). Heavy rainfall in 2015 refilled and flooded the reservoir, though water level dropped about five feet below conservation pool by summer 2018. From fall 2018 to spring 2019, the reservoir was at full pool, but the reservoir has declined in water level since to about 7-ft. below conservation pool by May 2023 (Figure 1). Other descriptive characteristics for Leon Reservoir are in Table 1.

Angler Access

Boater access consisted of three public boat ramps. Chock-a-Block Ramp was usable during the entire survey period. The primary public boat ramp at the Leon Reservoir Dam was unusable for a brief period because of low water level. However, a low-water ramp on a section of shoreline close to the dam ramp was made available by ECWSD to allow boater access to the reservoir. Bank fishing access was limited to the areas around boat ramps and the LaMancha Resort. Additional boat ramp characteristics are in Table 2.

Management History

Management strategies and actions from the previous survey report (Homer and Goldstrohm 2018) included:

1. Stock Florida Largemouth Bass fingerlings at 500/shoreline km if water level conditions are appropriate.

Action: Largemouth Bass were stocked annually from 2019-2023. In 2019, ShareLunker fingerlings were stocked. Lonestar Bass were stocked in 2023.
2. Stop annual surveys for hydrilla coverage and monitor for the invasive species during habitat and vegetation surveys.

Action: Annual roving surveys for monitoring hydrilla coverage were discontinued in 2019. A vegetation survey was conducted in summer 2022, and no hydrilla was observed.
3. Promote the underutilized White Bass fishery through press releases and outreach events.

Action: The reservoir's fisheries were promoted through various popular press articles.
4. Educate the public about invasive species with media and the internet. Make a speaking point about invasive species when presenting to constituents.

Action: Multiple popular press articles were written during the survey period. Also, interviews were conducted with local media to discuss the threats of invasive species, and multiple presentations were given to bass clubs and other groups. Clean, Drain, Dry signage was also placed and maintained at the public boat ramps.

Harvest regulation history: Sport fish in Leon Reservoir have always been managed with statewide harvest regulations (Table 3). In September 2021, a new statewide regulation was enacted for Blue and Channel Catfish that enforced no minimum length limit and a 25-fish daily bag limit which only 10 fish \geq 20 inches may be harvested.

Stocking history: While Leon Reservoir has been stocked with a variety of species since its impoundment, Florida Largemouth Bass have been the most frequently stocked. Florida Largemouth Bass were last stocked 2021. ShareLunker Largemouth Bass fingerlings were also stocked in 2019. Lonestar Bass were stocked in 2022. A complete stocking history is presented in Table 4.

Vegetation/habitat management history: Hydrilla was first documented in 2010 but was limited to the northeast section of the reservoir near the LaMancha Resort. The hydrilla was mechanically removed in one cove bordering the resort. However, additional areas containing isolated patches of hydrilla were not treated. Since its discovery, hydrilla has not presented access problems at the reservoir. Exotic salt cedar and giant reed have also been documented at the reservoir during the survey period, but no actions have been taken to control them.

Water transfer: No interbasin transfers are known to exist.

Methods

Surveys were conducted in accordance with the objective-based sampling (OBS) plan for Leon Reservoir (Homer and Goldstrohm 2019). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected, and surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2022).

Electrofishing – Largemouth Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by night-time electrofishing (1 hour at 12, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

Tandem hoop netting – Channel Catfish were collected using tandem hoop netting (9 tandem series at 9 stations). CPUE for tandem hoop netting was recorded as the number of fish caught per tandem series set (fish/tandem series).

Trap netting – White and Black Crappie were collected using trap nets (10 net nights at 10 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn).

Gill netting – Channel Catfish and White Bass were collected by gill netting (5 net nights at 5 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn).

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2022). Micro-satellite DNA analysis was used to determine genetic composition of individual fish since 2005 and by electrophoresis for previous years.

Statistics – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE.

Habitat – A vegetation survey was conducted in summer 2022 by the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2022).

Water level – Source for water level data was the United States Geological Survey (USGS 2023).

Results and Discussion

Habitat: During the summer 2022 survey, structural habitat present consisted primarily of natural shoreline, docks, and standing timber. Hydrilla was not observed during the survey.

Prey Species: The prey fish community was dominated by Threadfin Shad, Bluegill, Longear Sunfish, and Gizzard Shad. Threadfin Shad catch was 215.0/h in 2022, which was lower than 305/h in 2018. Gizzard Shad catch rates declined substantially from 671.0/h in 2014 to 450.0/h in 2018 to 66.0/h in 2022 (Figure 2). Index of Vulnerability decreased from 80 in 2018 to 48 in 2022 which indicated an increased proportion of large (i.e., >7 inches TL) Gizzard Shad, and nearly half were not optimal sizes for sport fish. Catch rate of Bluegill increased from 251.0/h in 2014, to 278.0/h in 2018 to 397.0/h in 2022 (Figure 3). From 2014-2022, the maximum length of Bluegill caught was 7 inches, thus Bluegill PSDs were low ($PSD \leq 18$), indicating that most fish were smaller than quality-length. Longear Sunfish catch rates decreased from 265.0/h in 2014 to 149.0/h in 2018 to 129.0/h in 2022 (Figure 4). Size ranges of Longear Sunfish in the surveys were comprised of fish 1-5 inches TL. According to the recent survey, an ample prey base existed for sport fish (see Appendix D).

Channel Catfish: Tandem hoop netting in summer 2022 yielded a poor sample of 15 Channel Catfish and a catch rate of 1.7/tandem series (RSE=26; Effort = 9 tandem series), which was lower than 2014 when a catch of 5.0/tandem series was documented. Gillnetting was conducted in spring 2023 to continue monitoring trends in catch and size structure (see Appendix E). From 2015 to 2023, Channel Catfish catch rates in spring gill netting surveys fluctuated from 8.2/nn in 2015 to 14.8/nn in 2019 to 7.2/nn in 2023 (Figure 5). The minimum sample size of 50 stock-length fish was not achieved in 2023 to effectively assess a reliable PSD. A minimum sample of five fish per inch group \geq stock length was not achieved during sampling; thus, relative weights were not able to be evaluated. Sampling effort to achieve desired sample sizes and precision were not practical, thus sampling was discontinued.

White Bass: White Bass during this survey period were monitored in conjunction with objective-based sampling for Channel Catfish. Catch rates for White Bass fluctuated from 12.4/nn in 2015 to 6.4/nn in 2019 to 11.2/nn in 2023 (Figure 6); all fish caught in these samples were \geq stock-length (i.e., 6 inches). Catch rates of legal fish varied from 11.0/nn in 2015 to 6.0/nn in 2019 to 11.2/nn in 2023. Mean relative weights were fair for the inch groups represented in the 2023 sample.

Largemouth Bass: Total catch rates for Largemouth Bass decreased from 196.0/h in 2016 to 157.0/h in 2018 to 110.0/h in 2022; catch rates of stock-length fish declined similarly (Figure 7). In 2022, catching of legal-length fish was like the prior two surveys. Except for the 2016 survey, CPUE-Total has experienced a decreasing trend since 2006 (see Appendix F). Largemouth Bass PSDs fluctuated during the survey period from 47 in 2016 to 67 in 2018 to 54 in 2022, though the size structure was relatively balanced. Mean relative weights were fair to optimal ($W_r = 84-98$) but there was not an obvious trend with length. Prevalence of Florida Largemouth Bass alleles increased from 39% in 2016 to 55% in 2022 (Table 6). Four pure Florida Largemouth were sampled in fall 2022. Prior to the 2022 survey, pure Florida Largemouth Bass in genetics samples were uncommon. The increase of alleles and pure Florida Largemouth Bass can likely be attributed to increased stocking frequency and survival of fingerlings. Only 8, 14-inch Largemouth Bass were caught and retained, and the Category II sample was not achieved to effectively assess age-at-legal-length.

Crappie: From 2014-2022, catch rates for both White and Black Crappie fluctuated, though White Crappie have been the most dominant in the trap net surveys (Figure 9; see also Appendix G). Total catch rates for combined White and Black Crappie fluctuated from 19.5/nn in 2014 to 4.0 in 2018 to 18.8 in 2022; a similar fluctuation in catch rates of fish \geq stock length also was observed. The decrease in crappie catch rate during 2018 may likely have been a result of dispersal of individuals following flooding in 2016-2017. Catches of legal-length White and Black Crappie were caught at a rate of 3.9/nn in 2022, which was nearly double than reported in 2018 and 2014. In 2022, the size distribution of Black and White Crappie was represented by

individuals >stock length, and lengths ranged from 6-14 inches TL. Mean relative weights of White Crappie \geq stock length were optimal (i.e., >90), whereas those for Black Crappie appeared mostly fair to poor (i.e., < 90).

Fisheries Management Plan for Leon Reservoir, Texas

Prepared – July 2022

ISSUE 1: During periods of drought, boat ramps become difficult to use. The boat ramp at the dam has a shallow slope and areas of broken pavement that need repair.

MANAGEMENT STRATEGY

1. Discuss Boater Access Grant and opportunities for repairs and enhancements to the public ramps with Eastland County Water Supply District.

ISSUE 2: Largemouth Bass support the most popular fishery at Leon Reservoir, and the reservoir has a history of producing a ShareLunker Legacy and other fish \geq 8 lbs. Recent stockings have been nearly annual and at a rate of 500/shoreline km rate, which is lower than the traditional rate. Monitoring data suggests improved prevalence of Florida Largemouth Bass alleles. However, catch rates have seen a declining trend likely influenced by water level and habitat availability.

MANAGEMENT STRATEGIES

1. Request Lonestar Bass fingerlings to be stocked at 500/shoreline km following an increase in water level to 75% reservoir storage capacity and increased habitat availability.
2. During the 2023-2027 cycle, conduct a Category II age and growth survey to evaluate growth of individuals in this population.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Educate local businesses and the controlling authority about invasive species by providing them with posters, literature, etc... so that they can (in turn) educate others.
3. Educate the public about invasive species with the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

Objective-based Sampling Plan and Schedule (2023-2027)

Sport fish, forage fish, and other important fishes: Sport fishes in Leon Reservoir include Largemouth Bass Channel Catfish, White Bass, and Black and White Crappie. Important forage species include Gizzard Shad, Threadfin Shad, and sunfishes, particularly Bluegill and Longear Sunfish.

Low-Density Fisheries: White Bass, Flathead Catfish, and Smallmouth Buffalo are present in the reservoir, but they do not support popular fisheries. White Bass are seldom targeted by anglers. Anglers reported directing 0.8% of the overall fishing effort towards White Bass at Leon Reservoir, whereas anglers have not reported any specific effort towards Flathead Catfish or Smallmouth Buffalo. White Bass have traditionally been co-targeted with Channel Catfish during spring gill netting surveys but catch rates have been low. White Bass will be monitored in conjunction with other species collected during gill netting. Relative abundance, PSD, and W_r may be estimated for White Bass should sample sizes be adequate.

Black Crappie are present in the reservoir, but White Crappie are more abundant and support more of the fishery. Therefore, monitoring for Black Crappie will be conducted in conjunction with trap netting for White Crappie. Data for Black Crappie will be aggregated to the White Crappie data and be reported as combined catch-per-unit-effort (CPUE). Presence/absence of the low-density species will also be documented while conducting other objective-based sampling.

Survey objectives, fisheries metrics, and sampling objectives

The sampling schedule is detailed in Table 7.

Prey species: Threadfin shad, Bluegill, Longear Sunfish, Gizzard Shad comprise most of the prey community in Leon Reservoir. Prey species have been traditionally monitored by night-time electrofishing for 12, 5-minute stations (1.0 hour). This effort has usually produced sufficient estimates in relative abundance and size structure for the more common prey species. In fall 2026, prey species will be monitored by nighttime electrofishing. Total catch-per-unit-effort (CPUE) will be determined for prey species with no target level of precision. A sample of ≥ 50 Gizzard Shad will be attempted to generate a length frequency distribution and evaluate Index of Vulnerability. A sample of ≥ 50 stock length Bluegill will be attempted to determine Proportional Size Distribution (PSD). If other sunfishes are sampled with ≥ 50 stock length fish, PSD may be calculated. If sampling objectives are not achieved, no additional sampling will be conducted unless additional sampling is necessary to achieve unfulfilled objectives for Largemouth Bass monitoring.

Channel Catfish: Channel Catfish support a small fishery at the reservoir, which anglers spent 5.5% of the total directed effort targeting them in the March-August 2013 creel survey (Homer and Goldstrohm 2014). Currently, Channel Catfish are managed under the statewide daily bag and size limit. Traditionally Channel Catfish have been monitored with spring gill netting surveys with an effort of 5 net nights, Total CPUE ranging from $1.7/n$ – $18/n$ and RSE's have ranged from 14-53 with traditional effort of 5 net nights. The last gill netting survey was conducted during spring 2023, and the total catch rate was below the average CPUE-Total of $8.7/n$. Gill netting survey effort of 5 net nights has not typically produced samples ≥ 50 stock length Channel Catfish to effectively evaluate size structure and body condition. Three exploratory tandem hoop netting surveys were conducted in 2010, 2014, and 2022, and catch rates were low and ranged from $1.7-5.0/\text{tandem series}$ with RSEs > 25 . Since tandem hoop netting has been

ineffective at Leon Reservoir, this method will not be used during the next monitoring cycle. Gill netting for Channel Catfish will be conducted with an effort of 7-10 nn to increase sample size to ≥ 50 stock length fish and to improve data precision for Total CPUE and Stock CPUE to $RSE \leq 30$. All Channel Catfish collected will be retained for age and growth. If additional sampling is needed, up to 5 additional nets may be set to achieve objectives.

Largemouth Bass: Largemouth Bass support the most popular fishery at the reservoir, and anglers reported allocating 86.2% of the overall directed fishing effort towards them in the March-August 2013 access creel survey. The reservoir is also one of the most popular Largemouth Bass tournament reservoirs in the Abilene District. A ShareLunker Legacy bass was caught in 2020, and multiple fish > 8 lbs. have also been caught since. Largemouth Bass have been managed by the statewide 14-inch MLL and 5-fish daily bag limit. Previous monitoring for Largemouth Bass has been achieved with nighttime electrofishing with 1.0 hour of sampling effort and has often yielded desirable sampling precision of $RSE \leq 25$ for CPUE-Total and Stock CPUE estimates. Florida Largemouth Bass have been stocked several times since 2018, and recent genetic analysis from a sample collected during fall 2022 suggested an increased number of pure Florida Bass as well as increased prevalence of Florida Largemouth Bass alleles. Sampling is necessary to monitor recruitment, trends in relative abundance, size structure, body conditions and growth. Sampling will be conducted at 12, 5-minute randomly selected stations for a total of 1.0 hour during fall 2026. Relative abundance (CPUE-Total, Stock CPUE, and CPUE-14) will be calculated, and target precision of CPUE-Total and Stock CPUE will be $RSE \leq 25$. A sample of ≥ 50 stock-length fish will be collected to evaluate size structure as PSD. A sample of ≥ 5 fish per inch group $>$ stock length will be measured and weighed to evaluate body conditions (i.e., relative weights). A Category II age sample of 13 fish, 13.0-14.9 inches will be conducted to evaluate age at legal length. Continuation of genetics monitoring is necessary to assess stocking performance and Florida strain genetic introgression into the population. Fin clips will be taken from a random sample of 30 fish to assess allele frequency of both the Florida and Northern Largemouth Bass strains. Should sampling objectives not be achieved, up to one hour of additional sampling may be conducted.

Crappie: Historical monitoring of both crappie species has been achieved by conducting trap netting during late fall, mostly every four years commonly with sets of 10 net nights. However, catch rates have been variable. Fluctuations in the relative abundance of crappie may be attributed to variations in habitat availability because of water level fluctuations as well as sampling effectiveness. Continuation of trap netting is necessary to monitor trends in crappie relative abundance, size structure, and body conditions. Trend data will be used to provide current information regarding the status of the fishery to constituents and reassess and refine management strategies. To monitor crappie, trap netting will be conducted during late fall 2026 at 10 randomly selected stations. Relative abundance (CPUE-Total, Stock CPUE, and CPUE-10) will be calculated for both species combined. Target precision for CPUE-Total and Stock CPUE of combined crappie will be $RSE \geq 30$; no target RSE will be set for CPUE-10. Given the historically low relative abundance of Black Crappie, no target precision will be attempted for their relative abundance estimates. A Category II age sample of 13 fish, 9.0-10.9 inches will be collected to assess age at legal length. At least 50 stock-length crappie (combined) will be collected to evaluate size structure as PSD. To assess body conditions (i.e., mean relative weights), ≥ 5 crappie per represented inch group \geq stock-length will be attempted to be weighed. No additional trap nets will be set up to improve data precision.

Creel: An access creel was last conducted during 2013-2014. Given the number of private residences with docks on the reservoir representation on bank angling was not adequately reflected in the survey. A

roving creel survey will be conducted from June 1, 2026 – May 31, 2027, to assess angler harvest, directed fishing effort, angler demographics, and expenditures.

Literature Cited

- Anderson, R.O., and R.M. Neumann. 1996. Length, weight, and associated indices. Pages 447-482 in B.R. Murphy and D.W. Willis, editors. Fisheries techniques, second edition. American Fisheries Society, Bethesda, Maryland.
- DiCenzo, V.J., M.J. Maceina, and M.R. Stimpert. 1996. Relations between reservoir trophic state and Gizzard Shad population characteristics in Alabama reservoirs. *North American Journal of Fisheries Management* 16:888-895.
- Guy, C.S., R.M. Neuman, D.W. Willis, and R.O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. *Fisheries* 32(7): 348.
- Homer Jr., M.D. and N. Goldstrohm. 2019. Statewide freshwater fisheries monitoring and management program survey report for Leon Reservoir, 2018. Texas Parks and Wildlife Department, Federal Aid Report F-221-M3, Austin, Texas.
- Texas Commission on Environmental Quality. 2022. Trophic classification of Texas reservoirs. 2016 Texas Water Quality Inventory and 303 (d) List, Austin, Texas.
- Kemp, J.J., H. Holmquist, K. Iqbal, B. Whitaker, and N. Leber. 2016. Volumetric survey of Leon Reservoir: September 2015 Survey. Texas Water Development Board, Austin, Texas.
- United States Geological Survey (USGS). 2023. National water information system: Web interface. Available: <https://waterdata.usgs.gov/monitoring-location/08099000/> (May 2023).

Tables and Figures

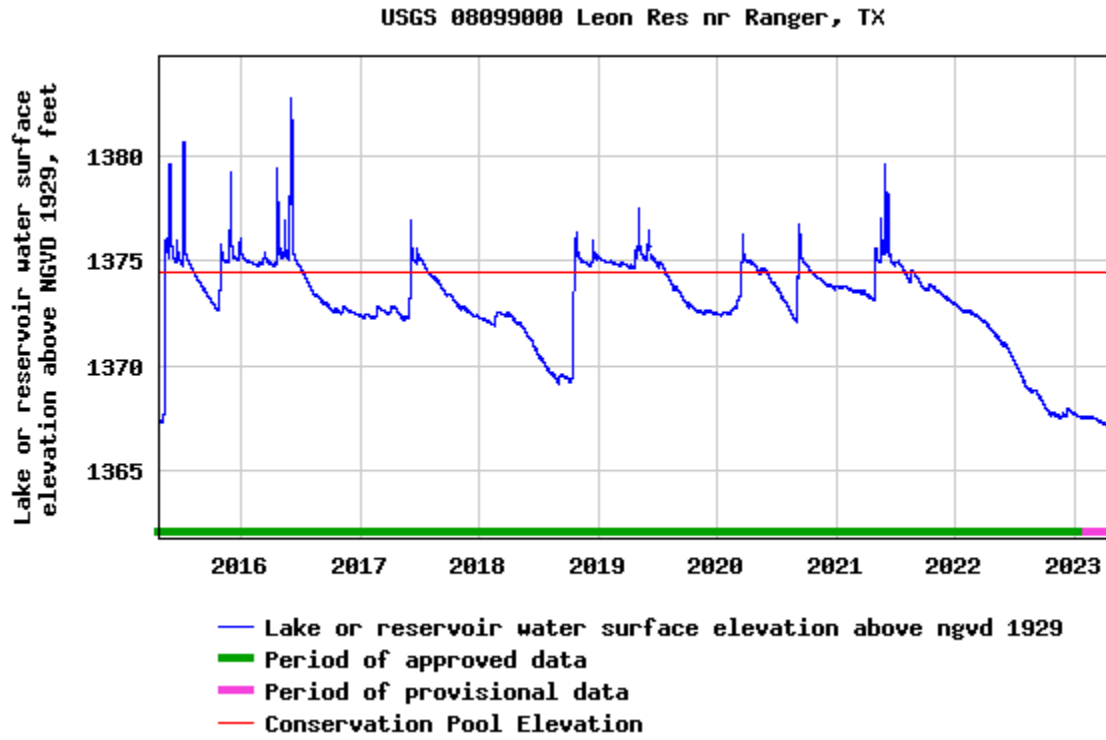


Figure 1. Daily water level elevations in feet above mean sea level (MSL) recorded for Leon Reservoir, Texas, April 2015 – May 2023 (USGS 2023). The red line indicates the conservation pool elevation.

Table 1. Characteristics of Leon Reservoir, Texas.

Characteristic	Description
Year constructed	1954
Controlling authority	Eastland County Water Supply District
County	Eastland
Reservoir type	Mainstem, Leon River
Surface Area (acres)	1,756
Conservation Pool Level (ft. above mean sea level)	1,375
River Basin	Brazos River
USGS 8-Digit HUC Watershed	12070201 (Leon)
Carlson's Trophic State Index	59.6

Table 2. Boat ramp characteristics for Leon Reservoir, Texas, May 2023. Reservoir elevation at time of survey was about 6 ft. below conservation pool elevation.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft.)	Condition
Chock-a-Block	32.363183° -98.723665°	Y	20	1,363	Accessible
Dam Ramp (main)	32.364629° -98.676099°	Y	8	1,368	Accessible; shallow
Dam Ramp (low water)	32.366274° -98.677170°	Y	6	Unknown	Accessible; shallow

Table 3. Harvest regulations for Leon Reservoir, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (only 10 \geq 20 inches)	None
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Largemouth	5	14-inch minimum
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Leon Reservoir, Texas. FRY= >1 in.; FGL = fingerling; ADL = adults.

Species	Year	Number	Size
Shad, Threadfin	1984	1,000	ADL
Bass, Florida Largemouth	1975	40,500	FGL
	1975	40,000	FGL
	1977	80,000	FGL
	1986	75,500	FRY
	1994	79,500	FGL
	2008	152,156	FGL
	2012	175,182	FGL
	2018	159,832	FGL
	2019	50,622	FGL
	2020	28,593	FGL
	2021	27,639	FGL
	Total	909,524	
Bass, Lonestar Largemouth	2022	40,170	FGL
	2023	30,478	FGL
	Total	70,648	
Bass, Largemouth	1969	146,000	FGL
	1970	50,000	FGL
	Total	196,000	
Bass, ShareLunker Largemouth	2019	13,496	FGL
Northern Pike x Muskellunge	1976	1,500	FGL
Bass, Palmetto (Striped x White Bass Hybrid)	1976	15,763	FGL
	1978	15,875	FGL
	1980	16,000	FGL
	Total	47,638	

Table 5. Objective-based sampling plan components for Leon Reservoir, Texas 2018–2019.

Gear/Target Species	Survey Objective	Metrics	Sampling Objective
<i>Electrofishing</i>			
Gizzard Shad	Relative Abundance	CPUE–Total	Practical Effort
	Size Structure	Length frequency	N≥50
	Prey Availability	IOV	N≥50
Bluegill	Relative Abundance	CPUE-Total	Practical Effort
	Size Structure	Length Frequency, PSD	N≥50 stock-length
Largemouth Bass	Relative Abundance	CPUE-Total, Stock CPUE, CPUE-14	RSE≤25 (CPUE-Total and Stock CPUE); Practical Effort for CPUE-14
	Size Structure	Length Frequency, PSD	N≥50 stock-length
	Body Conditions	W_r	N≥5 fish/inch group
	Genetics	FLMB and NLMB alleles	N=30 (random)
<i>Tandem hoop netting</i>			
Channel Catfish	Relative Abundance	CPUE-Total, Stock CPUE, CPUE-12	Practical Effort
	Size Structure	Length Frequency, PSD	N≥ 50 stock-length
	Body Conditions	W_r	N≥5 fish/inch group; Practical Effort
<i>Gill netting</i>			
Channel Catfish	Relative Abundance	CPUE-Total, Stock CPUE, CPUE-12	RSE≤25 (CPUE-Total and Stock CPUE); Practical Effort (CPUE-12)
	Size Structure	Length Frequency, PSD	N≥ 50 stock-length; Practical Effort
	Body Conditions	W_r	N≥5 fish/inch group; Practical effort
<i>Trap netting</i>			
Crappie	Relative Abundance	CPUE–Total, CPUE–Stock, CPUE-10	RSE≤30 (CPUE-Total; Practical Effort for Stock CPUE and CPUE-10)
	Size Structure	Length Frequency, PSD	N≥50 stock-length
	Body Conditions	W_r	N≥5 fish/inch group

Gizzard Shad

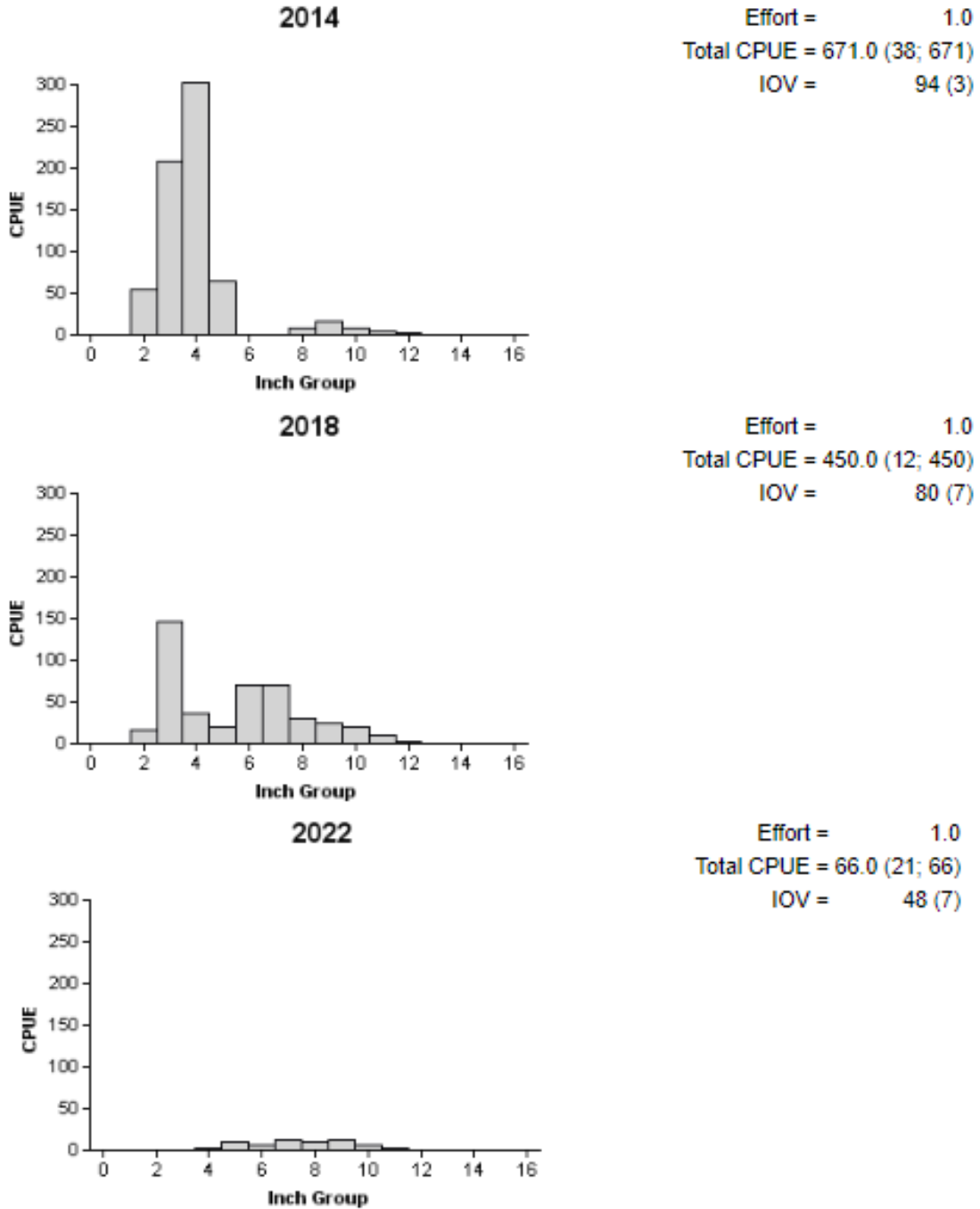


Figure 2. Number of Gizzard Shad caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Leon Reservoir, Texas, 2014, 2018, and 2022.

Bluegill

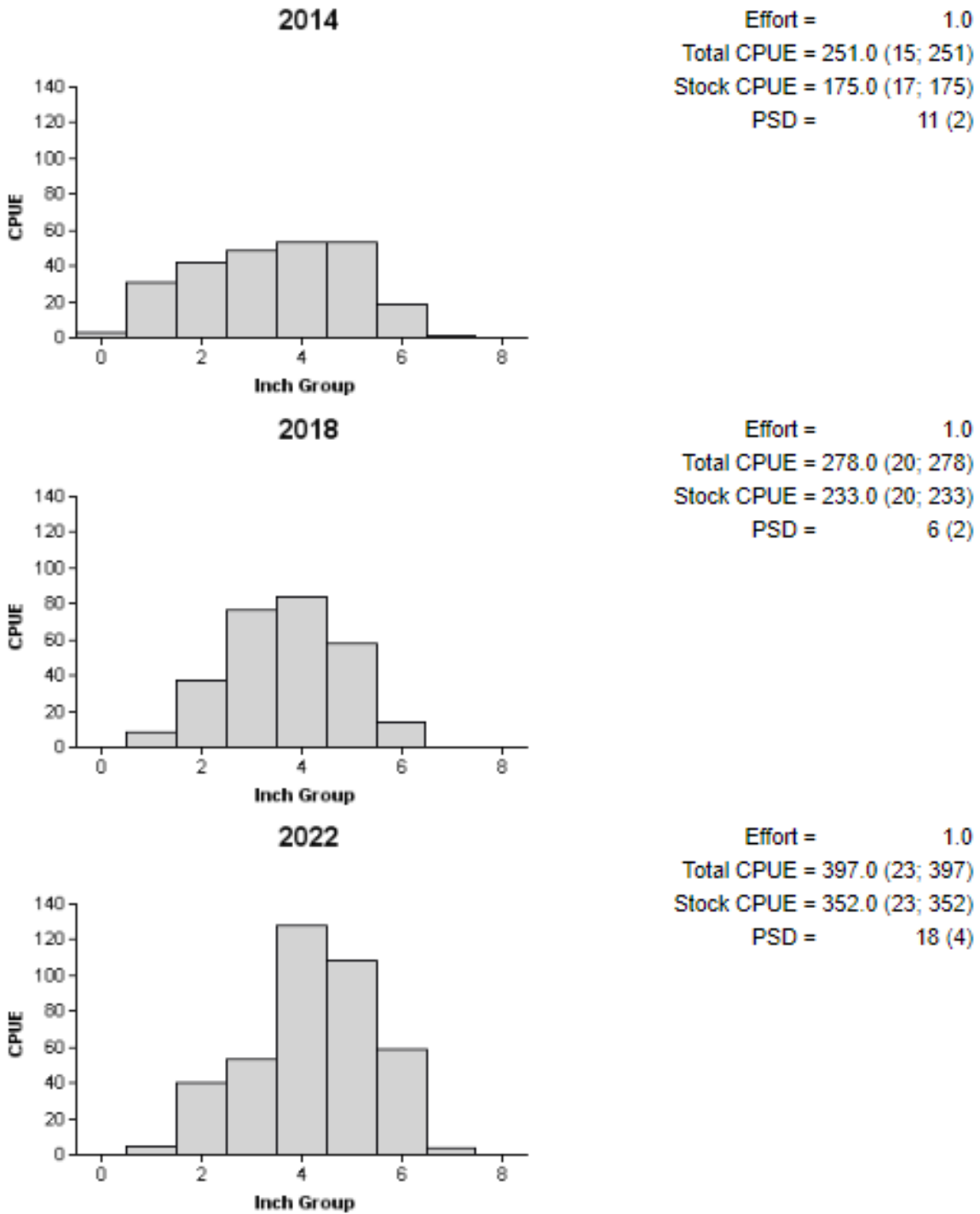


Figure 3. Number of Bluegill caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for PSD are in parentheses) for fall electrofishing surveys, Leon Reservoir, Texas, 2014, 2018, and 2022.

Longear Sunfish

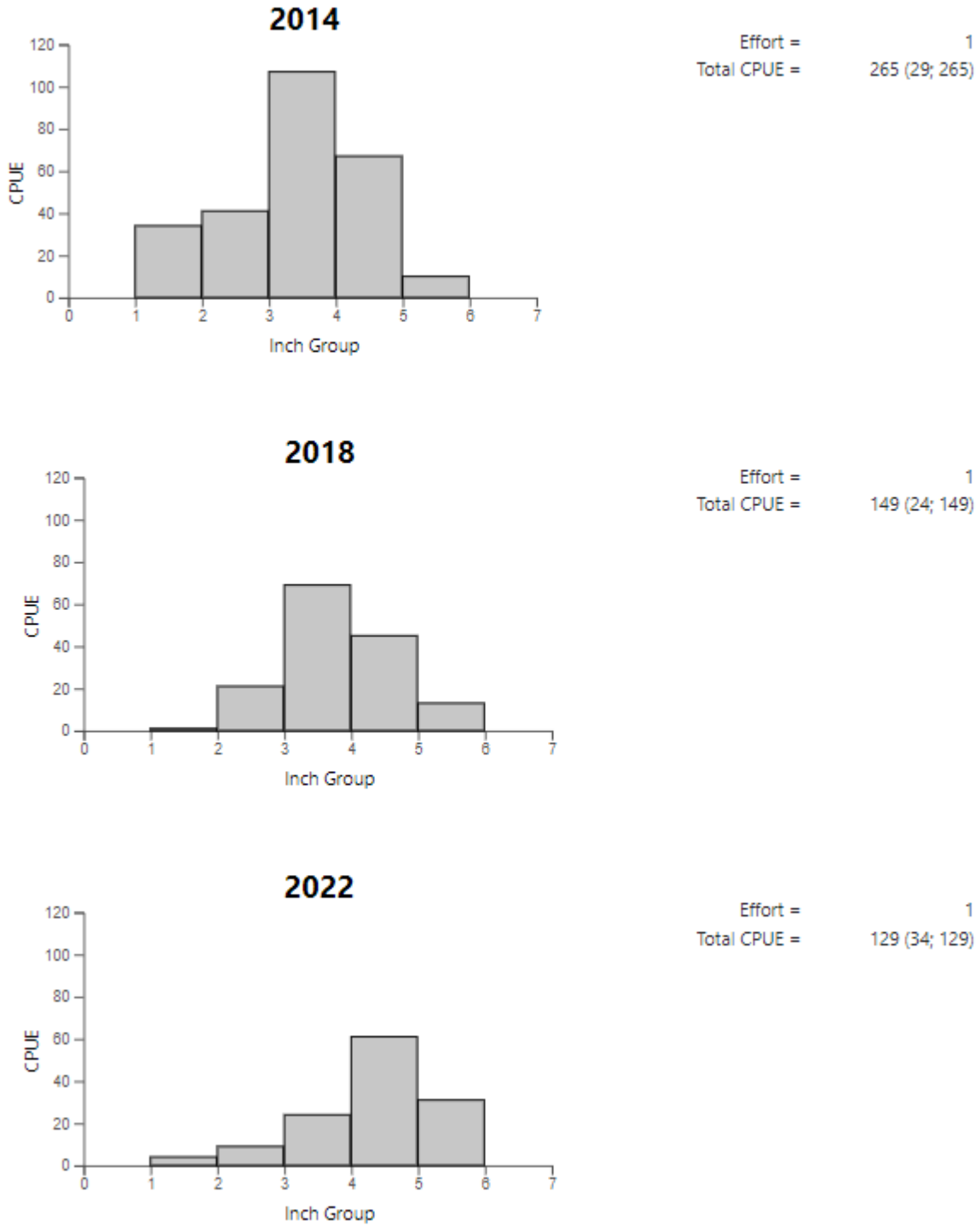


Figure 4. Number of Longear Sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE in parentheses) for fall electrofishing surveys, Leon Reservoir, Texas, 2014, 2018, and 2022.

Channel Catfish

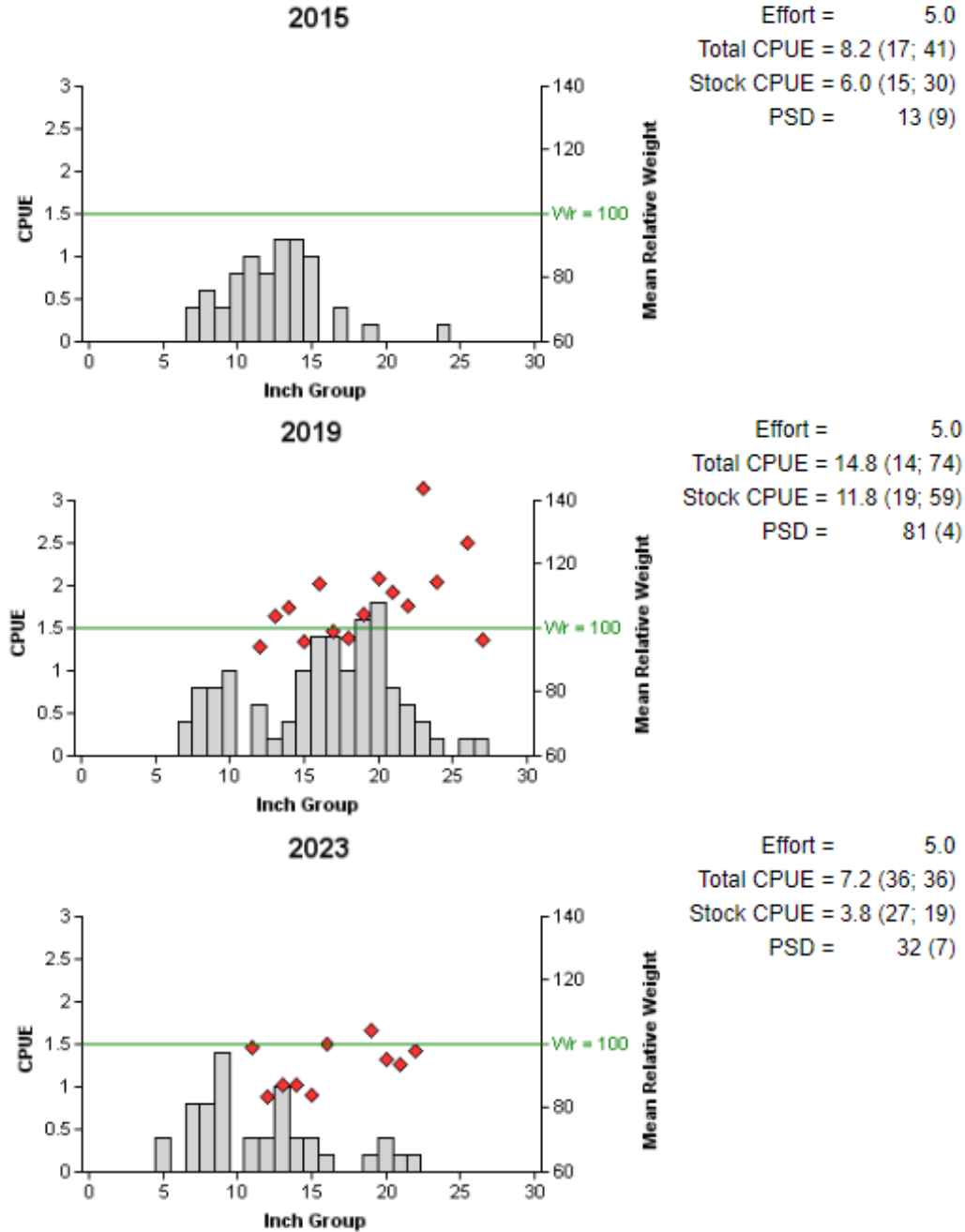


Figure 5. Number of Channel Catfish caught per net night (CPUE, bars), population indices (RSE and N for CPUE and SE for PSD are in parentheses) and mean relative weights (diamonds) for spring gill netting surveys, Leon Reservoir, Texas, 2015, 2019, and 2023.

White Bass

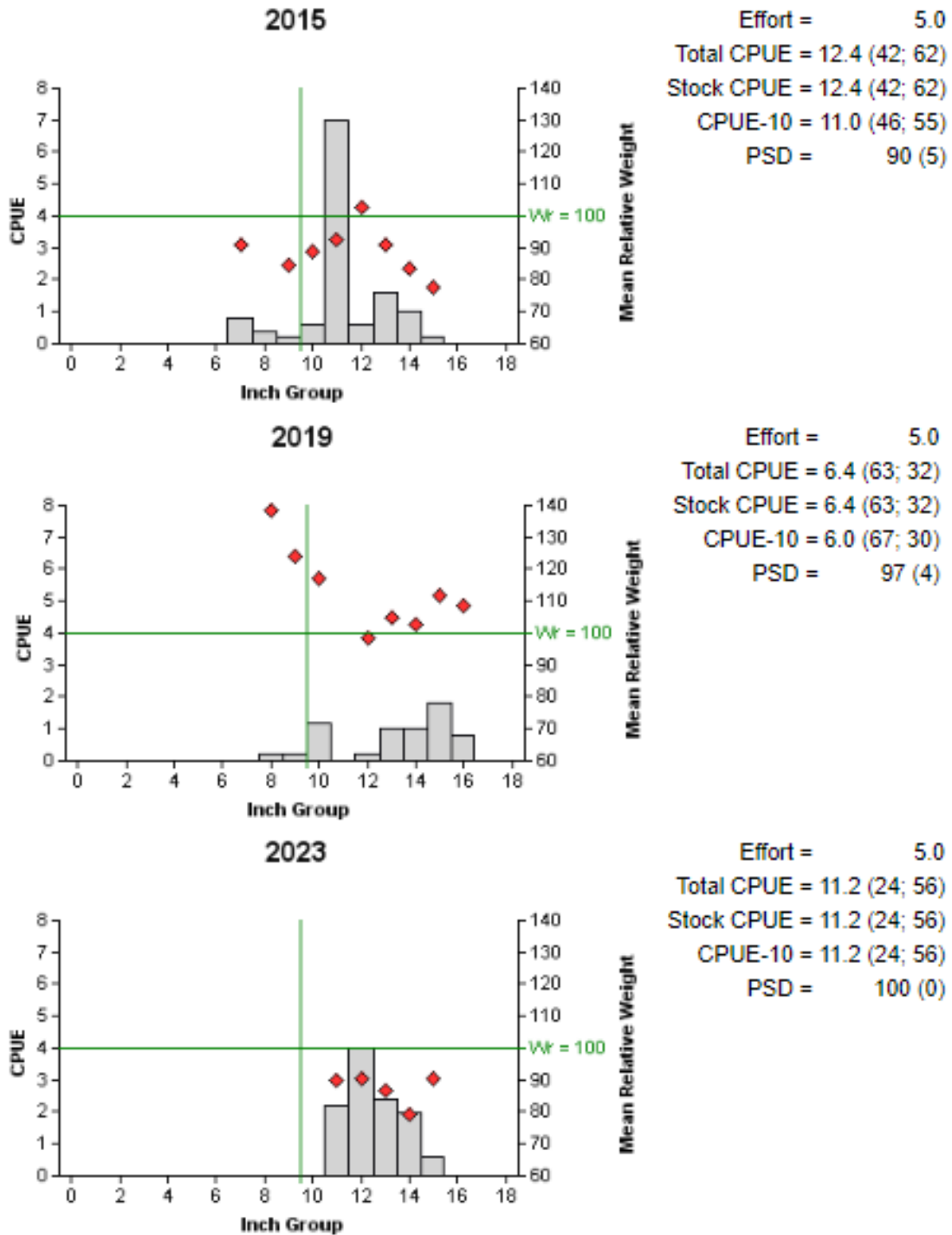


Figure 6. Number of White Bass caught per net night (CPUE, bars), population indices (RSE and N for CPUE and SE for PSD are in parentheses) and mean relative weights (diamonds) for spring gill netting surveys, Leon Reservoir, Texas, 2015, 2019, and 2023. The vertical line denotes the minimum length limit, and the horizontal line represents relative weight at 100.

Largemouth Bass

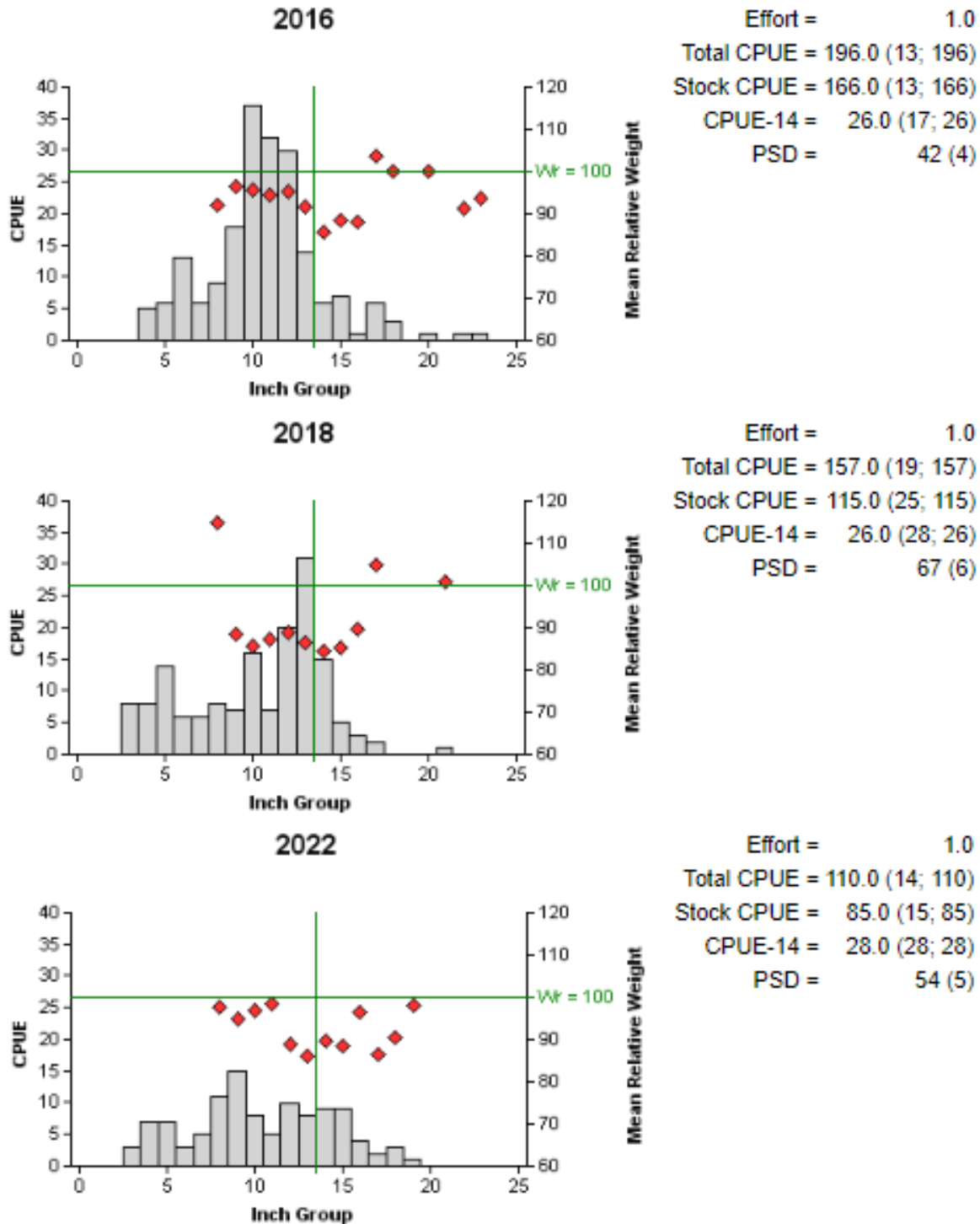


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), population indices (RSE and N for CPUE and SE for PSD are in parentheses) and mean relative weights (diamonds) for fall electrofishing surveys, Leon Reservoir, Texas, 2016, 2018, and 2022. The vertical line denotes the minimum length limit, and the horizontal line represents relative weight at 100.

Largemouth Bass

Table 6. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Leon Reservoir, Texas, 1992-2022. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by micro-satellite DNA analysis from 2005 to 2022 and by electrophoresis for previous years.

Year	Sample Size	Number of Fish			% FLMB Alleles	%FLMB
		FLMB	Intergrade	NLMB		
1992	30	0	12	18	9.0	0.0
1995	30	1	16	13	26.7	3.3
2000	30	1	16	13	20.8	3.3
2002	49	2	36	11	34.7	4.1
2004	32	1	22	9	28.0	3.1
2006	394	0	337	57	29.3	0.0
2014	30	1	29	0	45.1	3.3
2016	30	0	25	5	39.4	0.0
2018	30	1	28	2	41.6	3.3
2022	30	4	26	0	55.0	13.0

Crappie

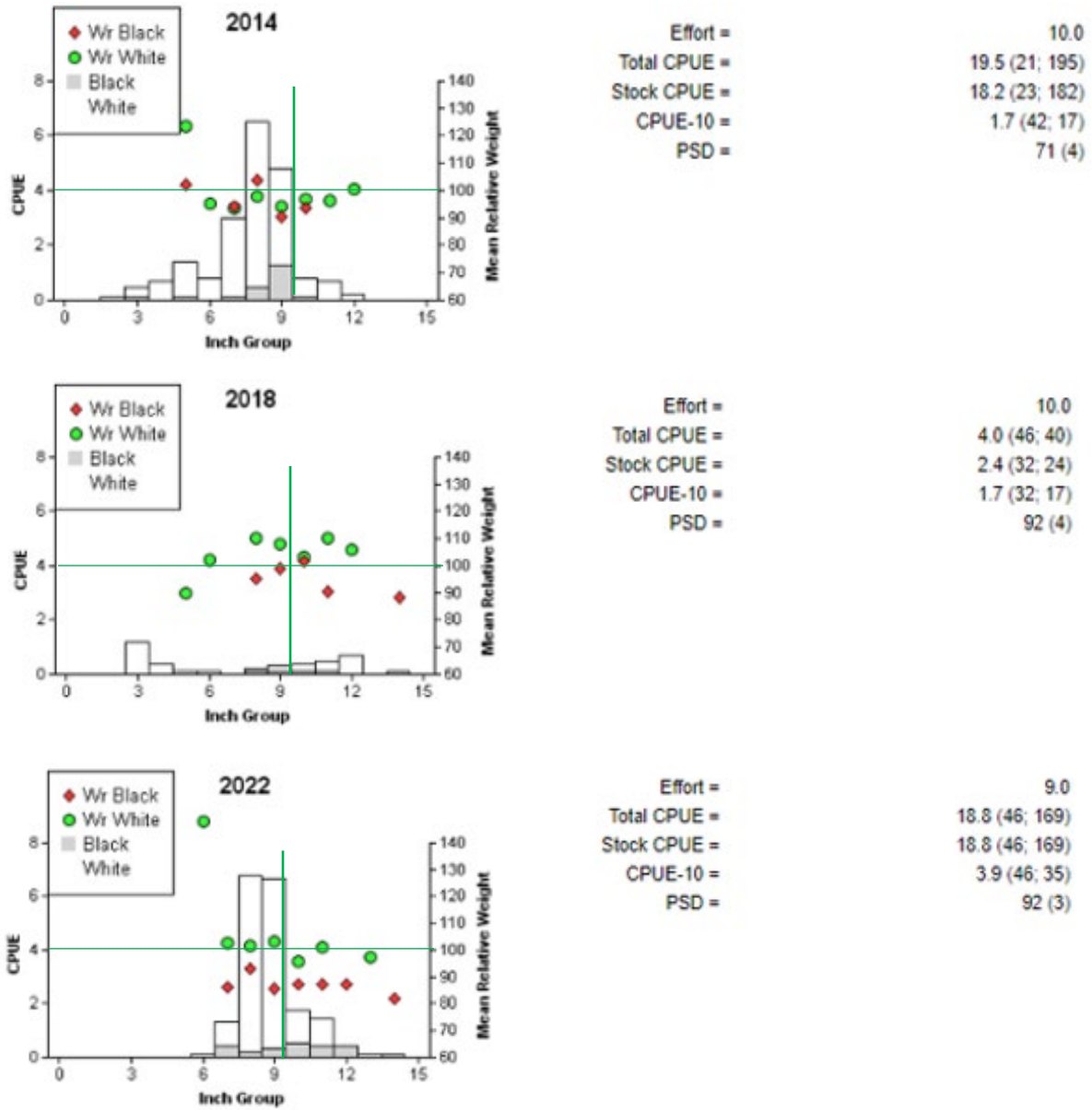


Figure 8. Crappie caught per net night (CPUE, bars), population indices (RSE and N for CPUE and SE for PSD are in parentheses) and mean relative weights for White (green circles) and Black Crappie (red diamonds) caught in fall trap netting surveys, Leon Reservoir, Texas, 2014, 2018, and 2022. The vertical line indicates the minimum length limit, and the horizontal line represents relative weight = 100.

Proposed Sampling Schedule

Table 7. Proposed sampling schedule for Leon Reservoir, Texas. The survey period is June through May. Electrofishing and trap netting surveys are conducted in the fall, and gill netting is conducted during the spring. The roving creel will be conducted June 1, 2026 – May 31, 2027.

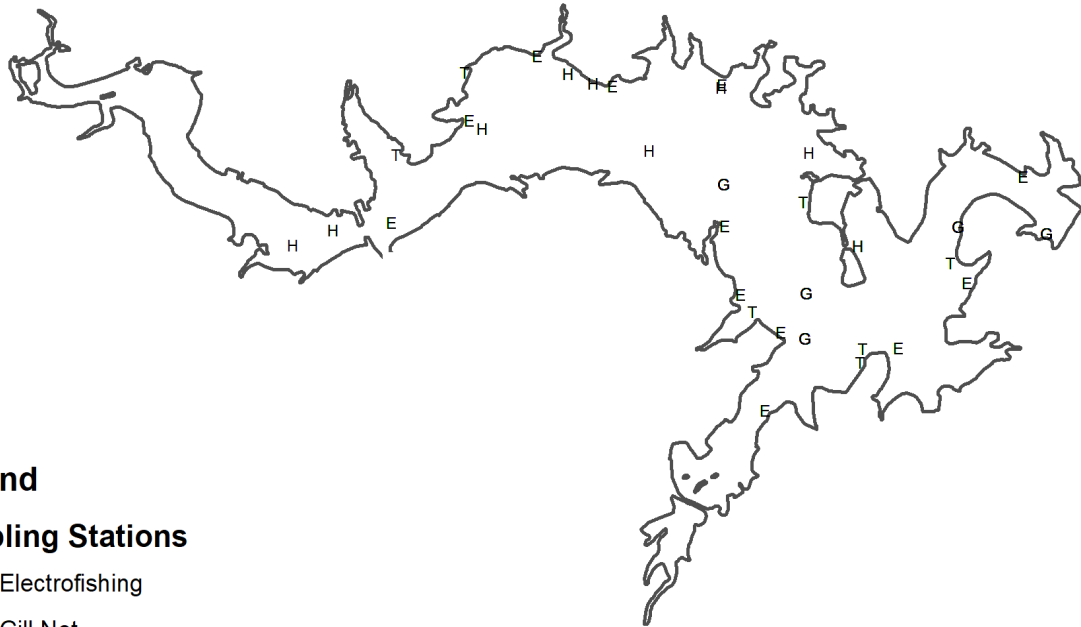
	Survey year			
	2023-2024	2024-2025	2025-2026	2026-2027
Angler Access				X
Vegetation				X
Electrofishing – Fall				X
Trap netting				X
Gill netting				X
Creel				X
Report				X

Appendix A

Number (N) and catch per unit effort (CPUE; RSE in parentheses) of all target species collected from all gear types from Leon Reservoir, Texas, 2022-2023. Sampling effort was nine tandem series for summer hoop netting, one hour for fall electrofishing, nine net nights for fall trap netting, and five net nights for spring gill netting.

Species	Electrofishing		Trap Netting		Gill Netting		Hoop Netting	
	N	CPUE	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad	66	66.0 (21)						
Threadfin Shad	215	215.0 (26)						
Channel Catfish					36	7.2 (36)	15	1.7 (26)
White Bass					56	11.2 (24)		
Green Sunfish	8	8.0 (62)						
Warmouth	3	3.0 (72)						
Orangespotted Sunfish	4	4.0 (77)						
Bluegill	397	397.0 (23)						
Longear Sunfish	129	129.0 (34)						
Redear Sunfish	5	5.0 (46)						
Largemouth Bass	110	110.0 (14)						
White Crappie			146	16.2 (46)				
Black Crappie			23	2.6 (50)				

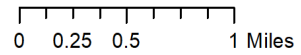
Appendix B



Legend

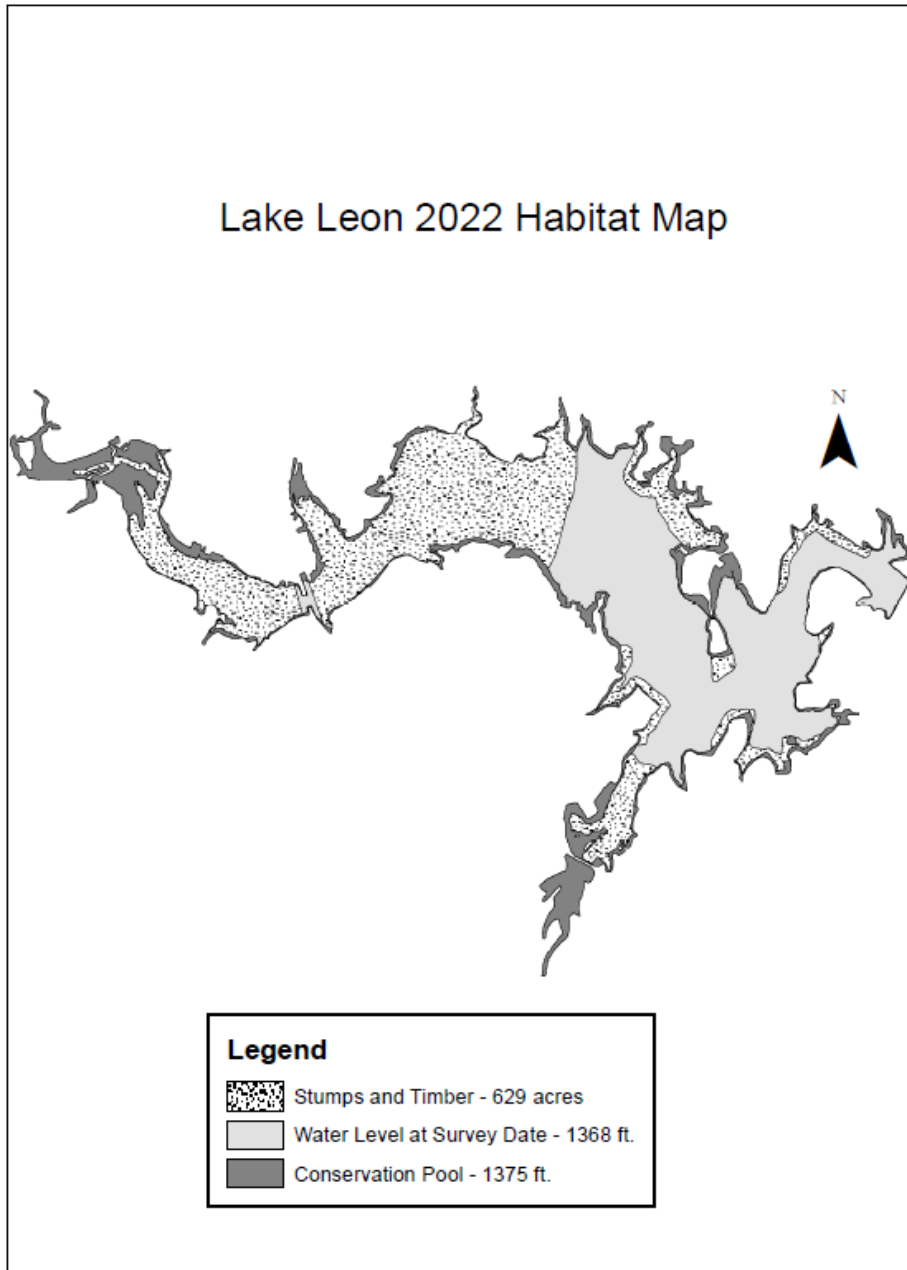
Sampling Stations

- E Electrofishing
- G Gill Net
- H Hoop Net
- T Trap Net
-  Reservoir



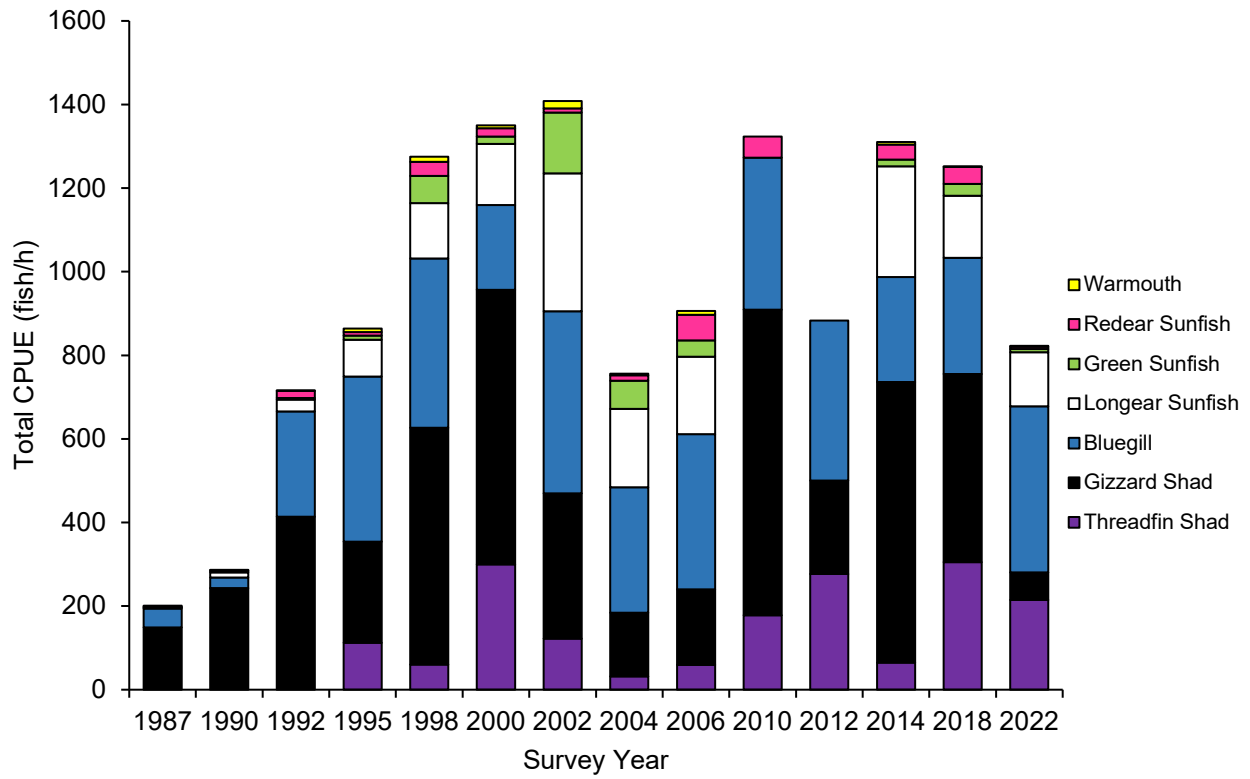
Locations of electrofishing (E), gill netting (G), tandem hoop netting (H), and trap netting (T) stations at Leon Reservoir, Texas, 2022-2023.

Appendix C



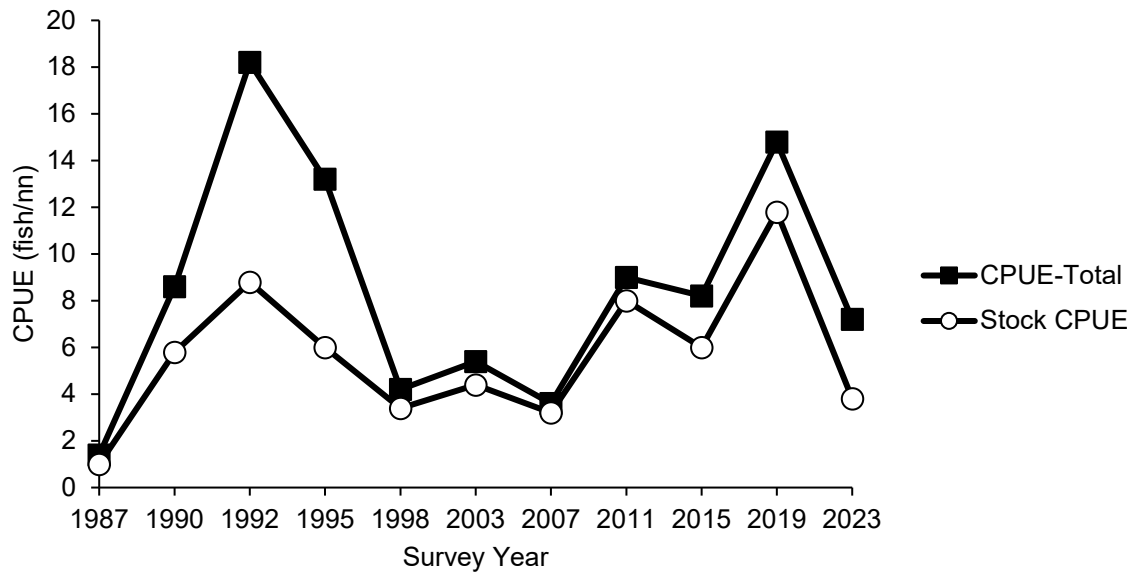
Map of habitat survey conducted in summer 2022, Leon Reservoir, Texas.

Appendix D



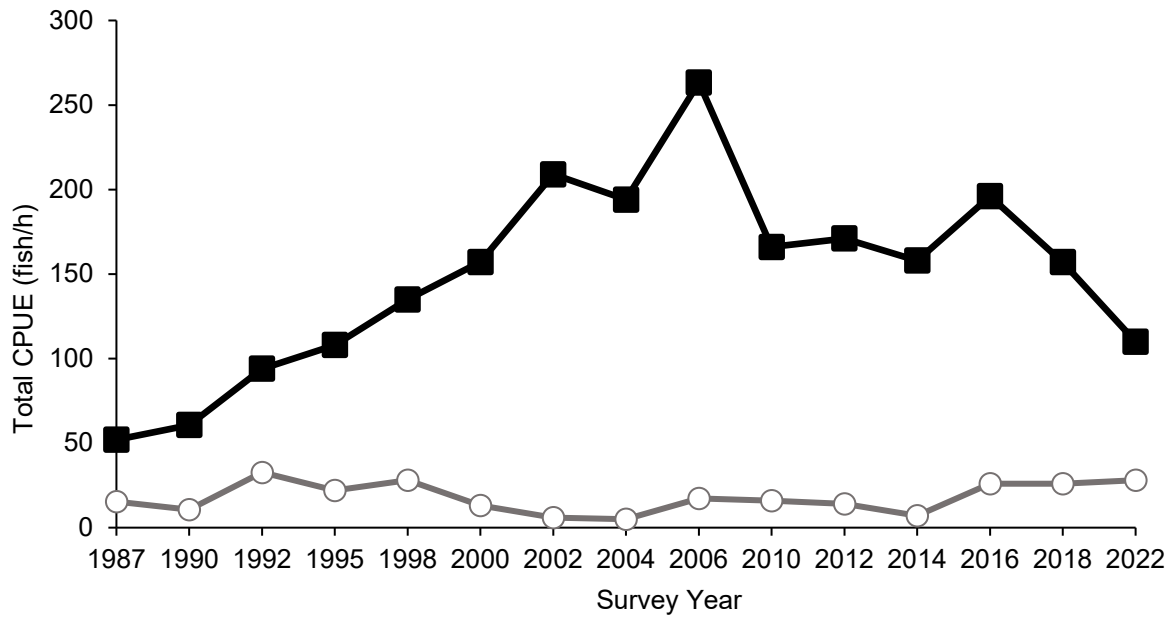
Cumulative catch per hour (CPUE) of common prey fish species sampled during fall electrofishing surveys at Leon Reservoir, Texas, 1987-2022.

Appendix E



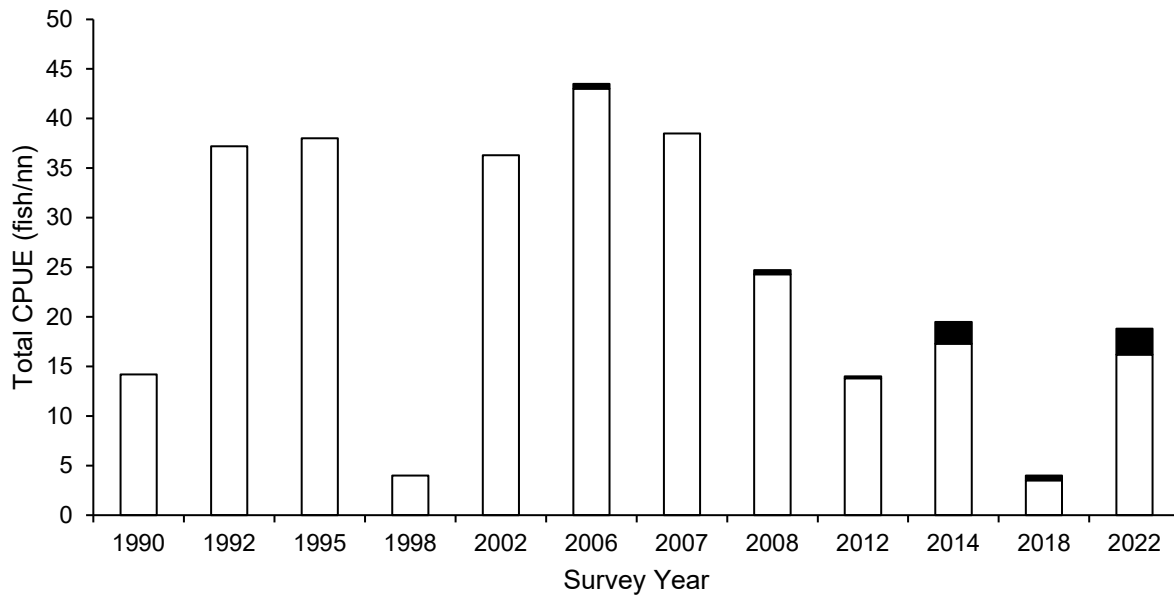
Total catch per net night (CPUE-Total; black squares) and Stock CPUE (hollow circles) of Channel Catfish surveyed during spring gill netting surveys, Leon Reservoir, 1987-2023.

Appendix F



Total catch-per-unit-effort (CPUE; black squares) and catch rates of legal Largemouth Bass (CPUE-14; hollow circles) during fall electrofishing surveys, Leon Reservoir, Texas, 1987-2022.

Appendix G



Catch per net night (CPUE) for White Crappie (white bars) and Black Crappie (black bars) sampled during fall trap netting surveys, Leon Reservoir, 1990-2022. Black Crappie were not sampled during the 2007 survey and those prior to 2006.



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